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# CURRENT LITERATURE.

## BOOK REVIEWS.

### Morphology of angiosperms.

THIS book,<sup>1</sup> which follows the one on gymnosperms by the same authors, seems a successful accomplishment of the authors' expressed purpose, "to organize the vast amount of scattered material so that it may be available in compact and related form." The want of such a book has long been felt by teachers, and several of the recently published accounts of research in this group make it evident that such a summing up of the facts and literature of the subject has been needed by investigators. The work is not merely a compilation, however, for much of the text, as well as the many pertinent figures credited to the authors, show that they themselves have worked over the subject-matter in many of its important phases.

In the introductory chapter are pointed out the differences between the gymnosperms and angiosperms, which, the authors believe, justify the raising of each of these groups to the rank of a grand division of the vegetable kingdom, as has been done by Warming and others. The close similarity shown by the monocotyledons and dicotyledons is given as sufficient reason for considering both groups together, in the discussion of each detail of development. The reviewer believes that the clearness, so characteristic of the book, could have been further enhanced by a separate treatment of each of these groups.

The discussion of the structure and development of the flower in chapter II is brief, but thoroughly modern, and it will doubtless serve a good purpose in helping to eradicate the older conceptions, still fostered in certain quarters by text-books and floras.

A detailed account of the phenomena of reproduction is given in six chapters (III-IX) with the following headings: microsporangium, megasporangium, female gametophyte, male gametophyte, fertilization, endosperm, and embryo. By the separate treatment of each of these phases of development the discussion gains much in lucidity and in convenience for reference.

The still debatable view of Strasburger that the gametophyte begins with the spore mother-cell, in which the characteristic reduced number of chromosomes first appears, is accepted by the authors. They hold that this view is supported also by the fact that in many temperate perennials the mother-cell stage is the one at which the seasonal rest in development occurs.

<sup>1</sup> COULTER, JOHN MERLE, and CHAMBERLAIN, CHARLES JOSEPH, *Morphology of Angiosperms (Morphology of Spermatophytes, Part II)*. 8vo. pp. vii+348. *figs.* 113. New York: D. Appleton & Co. 1903. \$2.50.

The morphological individuality of the megasporangium is insisted upon, and the same claim is made for the sepal, petal, stamen, and carpel.

In the chapter upon the female gametophyte the development of this structure is followed up to fertilization, including the specialization of various parts of the embryo-sac as haustoria. The meaning of the constant occurrence of a definite number of chromosomes in each species is discussed, and also the criterion for distinguishing megaspore from megaspore mother-cell.

The chapter on the male gametophyte deals with the formation and germination of the microspore, and the reduction question. The authors hold that a qualitative reduction of chromosomes is not yet proven. The structures appearing in the pollen grain at germination they believe to represent an antheridium only, of which the pollen tube is the much elongated wall-cell.

In the discussion of fertilization, chalazogamy is thought to be an insufficient evidence of primitiveness. The centrosome is not demonstrated in angiosperms. "Double fertilization" is regarded a misleading name for the process so called, since this and all other nuclear fusions occurring in the embryo-sac probably differ profoundly from the fusion of the male nucleus with that of the egg.

In the chapter on the endosperm the various types of development of the part of the embryo-sac dominated by the endosperm nucleus are described. The endosperm is believed to be a renewed growth of the female gametophyte.

The specialization of parts of the proembryo and embryo for food absorption during development is emphasized in the chapter on the embryo. The characters of the cotyledons, it is held, cannot yet be considered as preponderating evidence in phylogeny. The chapter concludes with an account of parthenogenesis and polyembryony.

The reviewer believes that a valuable addition to the book could be made by following the chapters on endosperm and embryo with a thoroughly modern account of the germination of the seed.

A clear and suggestive résumé of our knowledge, and ignorance, of the interrelationships of the Monocotyledones, Archichlamydeae, and Sympetalae is contained in chapters X, XI, and XII.

Geographical distribution and fossil angiosperms are treated in the two following chapters. There is a concise and very useful summing up here of facts concerning these topics, which have been gathered from sources widely scattered and often inaccessible.

The facts of morphology assume definite relation and proportion only when they are built into some scheme attempting to express the phylogeny of the forms concerned. Such schemes of phylogeny are also the most useful indicators, to the investigator, of the forms most likely to yield important morphological results. If the scheme followed is erroneous, the worker is likely soon to discover the faults of the tool, and the refutation of a wrong

scheme of phylogeny is to be counted a step in advance, even though it be replaced by another imperfect one. The authors are, therefore, quite justified in giving the concise review and criticism of current views of the phylogeny of vascular plants that is to be found in chapter xv. Very important also, in its bearing on this subject, is the presentation of the leading facts of the anatomy of the vascular plants, given in the two concluding chapters of the book by professor Edward C. Jeffrey, of Harvard University.

The well arranged and efficiently complete bibliographies are sure to prove a most valuable feature of the book to investigators. An adequate series of figures has been well selected from many sources, and they are admirably executed, excepting perhaps the never-satisfying photomicrographs of the embryo-sac.—D. S. JOHNSON.

### Experimental morphology.

THE LITERATURE of experimental morphology has received an important addition by Dr. Klebs. The present publication<sup>2</sup> is really a continuation of his older work (1896) on the physiology of reproduction in algae and fungi, and carries the theoretical as well as the experimental side of the subject of reproduction and development into higher plants. Beginning with a short history of the development of this branch of botany, from the time of Knight forward, the introduction proceeds with definition and discussion of such subjects as specific structure, causality, external and internal conditions, the teleological point of view, etc. As would be expected, this author does not regard a teleological explanation as any explanation at all. His clear exposition of the purely objective method of interpretation will doubtless be a great help to students who have difficulty in breaking away from the sometime prevalent teleology. His discussion of external and internal conditions is hardly satisfactory, however; one feels that, after all, the division, convenient as it may be, is an arbitrary one. Indeed, to the reviewer it seems as though we might soon be able to discard both terms altogether, naming a stimulus where we have come to know it and confessing ignorance where it is still outside our knowledge. A physiology based on study of the protoplasm can hardly make a distinction between external and internal factors; the cell sap is physiologically as much external to the organism as is the atmospheric air, and the protoplasm itself is probably made up of a number of different systems, often external to one another, and influencing one another in many ways.

Klebs describes several new and instructive experiments with *Ajuga reptans*, *Glechoma hederacea*, *Veronica chamaedrys*, and others. By darkness, rather high temperature, and plenty of moisture, cuttings of the flowering shoot of *Ajuga reptans* were transformed into runners, producing rosettes instead of the normal floral bracts and flowers. Also, a runner submerged in water grows erect to the surface of the medium and then returns to its hori-

<sup>2</sup> KLEBS, G., Willkürliche Entwicklungsänderungen bei Pflanzen. pp. iv + 166. figs. 28. Jena: Gustav Fischer. 1903.